TO: Kristie Warr

FROM: Rick Haaker, CHP, CIH

SUBJECT: Review of Las Conchas Fire Work Order 11-07023
(Chain of Custody No. 6-070411-123526-0004) Sr-90 data.

DATE: 7/27/2011

Sr-90 results are transmitted in this memo. The total strontium results that are included have already been transmitted, so they should already be in the record system. No Sr-90 was detected in the analyses. The presence of Sr-90 would have been inferred by performing a second count on the total Sr samples after allowing a period of time for Y-90 ingrowth to occur. A recount had been requested on the total strontium aliquot for sample A006-110704-0922-1-T01 due to what appeared to be a marginally elevated count rate above background on the initial count. The second sample, A008-110704-0710-1-T02, was recounted because the initial count rate appeared to be significantly elevated relative to background.

This is an update to a memo that was dated 7/22/2011. It clarifies the basis for assigning the data qualifiers JH and JL as described below. Data transmitted prior to 7/26/2011 had the qualifiers JH and JL reversed on a small number of results. None of the results being transmitted by this memo were affected.

The EDD is transmitted as “11-07023-Reviewed-Sr90.xls”.

There is supplemental data in the XLS format data file:
“LasConchas-11-07023-sr90-Only.accdb supplement7-27-11.XLS.”
It contains results for “Net Concentration” and “Net Concentration Propagated Error.”

The data were reviewed for accuracy, completeness, and any apparent issues. During data review a qualifier “UB” was assigned if the activity result is less than five times the activity result of the method blank. A “UB” qualifier denotes that an analyte is non-detect due to lack of activity relative to a blank concentration. Unused filters from the same lot as the sample filters were used as the method blank. None of the analytes of concern (Sr-90 and Total Sr) were detected in the method blank.

Data without a UB qualifier was further reviewed.

A “U” was assigned to the Assigned Qualifier column when result was less than 50% of the MDA. In this case the analytical result was assigned to be one-half of

the MDA in the "ValidatedResult" column. The validated result should be considered an upper bound estimate in this case.

A “J” was assigned if the result was between 0.5 of the MDA and the MDA. The validated result is the reported result. The validated result represents an estimated value in this case.

A “JH” or “JL” would be based on percent recovery (the "RadioPercentRec", and “GravPercentRec” columns of the Eberline Services report. Below 70% would result in assignment of a JH to denote that the reported result is estimated with more uncertainty than usual, and with a potential positive bias. Recoveries above 130% would result in assignment of a JL to denote that the reported result is estimated with more uncertainty than usual, and with a potential negative bias.

No samples had recoveries outside of the acceptance range.

The assigned data qualifiers are found in column “AssignedQualifier”.

The effective air volume for the various analytes of the various air samples in cubic meters are provided in the column “AliquotNetEquiv” of the EDD.

Note that the blank results are in pCi/m^3. The volumes that Eberline Services assigned to the blanks for a given analyte are the average of the effective volumes for the samples in the sample set for that analyte.

Air volumes that were collected in this sample set were in the range of 518 to 613 cubic meters, but only about 5% of the samples were allocated for strontium-90 / total strontium analyses. There is no indication of whether the air volumes on the Chain of Custody represent the sample air volumes at standard temperature and pressure.

No discrepancies were found in the transcription of sample IDs or sample volumes from the chain of custody to the EDD.

Net Concentration

Eberline Services reported concentration and uncertainty results which were corrected for instrument background. They also reported concentration and uncertainty results for the method blank. They did not report “net concentration”, which is the sample result minus the result for the method blank, probably because their written procedure does not include that calculation and it was not specified in the Purchase Order. The “Net Concentration” is the concentration result reported by Eberline Services corrected for the contribution of the method blank. The net concentration may be calculated from Eberline Services data as indicated in equation 1.

Equation 1.

Net Concentration = (Result * Sample Volume – Blank Result * Blank Volume)/Sample Volume

In equation 1 the *sample volume* is the sample air volume from the chain of custody times the fraction of the sample filter allocated to the particular analysis. The blank volume is the average of the *sample volumes* for all samples submitted on a particular chain of custody times the fraction of the sample filter allocated to the particular analysis. Negative net concentrations were assigned a concentration of zero after this calculation.

Net Concentration Propagated Error

The propagated errors "Uncertainty" in the Eberline Services EDD are, according to their written procedure, based on a 95% confidence interval. The Net Concentration Propagated Error (NPCE) was calculated as indicated in equation 2.

Equation 2.

$$NPCE = [[(\text{Uncertainty Result} * \text{Sample Volume})^2 + (\text{Uncertainty Blank Result} * \text{Blank Volume})^2]^{0.5})/\text{SampleVolume}$$

The Net Concentration Propagated Error result is in a column entitled ErrorNet in the supplemental excel data file, which is attached.

Minimum Detectable Activity (MDA)

The equations for MDA in the Eberline Services written procedure assume that the count time for the sample and the background counts are the same. The results for background count rate in the EDD appear to be truncated to one significant digit, so it is unlikely the MDA results reported by Eberline Services can be replicated exactly by an independent calculation.

References

AP-018 Operation of the Alpha Spectroscopy System, Eberline Services Oak Ridge Laboratory Analytical Procedure, October 31, 2010.